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URBAN AND REGIONAL LAND USE ANALYSIS:
CARETS AND CENSUS CITIES EXPERIMENT PACKAGE

MONTHLY PROGRESS REPORT

SKYLAB/EREP INVESTIGATION NO. 469

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Monthly Progress Report: July 16, 1973
Investigation No. 469

a. Overall status, including problem areas and significant progress to date.

Skylab/EREP Investigation No. 469 is a program or team investigation conducted by staff members of the Geographic Applications Program, U.S. Geological Survey. That Program is currently developing and testing land use classification and analysis procedures for a proposed new nationwide land use information service, to provide timely data on land use and land use change as required by newly emerging cooperative arrangements between the Federal government and state and regional land use planning agencies. Remote sensing is expected to provide a major share of the required data input for the new land use information service. A proposed land use classification system is being tested in various regions and environmental situations for its utility as an overall vehicle for describing and encoding data from remote sensors (USGS Circular 671, "A Land Use Classification System for Use With Remote-Sensor Data", 1972).

The Skylab EREP is being examined, in this investigation, as a potential source of data for monitoring land use and its environmental impact. The investigation is being coordinated closely with ERTS investigations covering the same test sites, and both will benefit from high-altitude aircraft data provided by the NASA Earth Resources Aircraft Program.

Investigation 469 consists of two major components, the Central Atlantic Regional Ecological Test Site (CARETS) and the Census Cities projects. Each of the major components is further broken down into subprojects, as follows:

Project 1: CARETS

- Subprojects: a. Land use analysis
b. User services
c. Land use climatology

Project 2: Census Cities

- Subprojects: (in desired priority order)
a. San Francisco
b. Washington
c. Phoenix
d. Tucson
e. Boston
f. New Haven
g. Cedar Rapids
h. Pontiac

Details of the projects and subprojects are contained in the contract work statement and will be elaborated as results from EREP are evaluated in the following reporting periods. In addition to the eight mandatory cities (see above) under the Census Cities project, other cities are designated as opportunity test sites under this investigation, to be covered if suitable data-gathering conditions exist.

During the months prior to launch of Skylab 1 and 2, the investigators were active in preparing correlative data bases, from high-altitude aircraft data, which are to be used to assist in evaluating both ERTS and Skylab data. For Levels I and II land use data, such correlative information is considered adequate for most purposes if taken within 6 months of the time of the Skylab information. For areas undergoing development at the time of the Skylab data-collection, correlative aircraft or ground observations should be taken within a one-month period from EREP observation. The land use climatology sub-project, on the other hand, requires certain ground truth observations to be taken simultaneously, or within the hour, of the spacecraft observation, so that corrections for atmospheric effects can be applied to enable surface energy budget calculations to be made. Therefore for that sub-project, the investigators maintained close contact with the Principal Investigators Management Office during the SL-2 mission. When the westward shift of the orbit required a change from the originally-scheduled Baltimore site for the land use climatology sub-project, two alternate sites were chosen, one in Washington, D.C., and the other near Riverside, California, taking advantage of the west coast location of one of our cooperating investigators, Robert W. Pease. The most critical requirement for site selection was availability of an inland water body or reservoir within the field of view of the S192 scanner. The method used for correcting for atmospheric effects calls for surface radiant temperature measurements to be obtained on a body of water sufficiently large to be clearly visible on the S192 imagery, and sufficiently small so that major currents would not render the surface too inhomogeneous for a reliable calibration. .

Field measurements with hand-held radiometer were made by cooperating investigators Robert W. Pease at Riverside during the June 2 track 63 pass, and John E. Lewis at Washington during the June 12 track 61 pass. Weather conditions over the sites were overcast at Riverside and cloud free but hazy at Washington. Weather Bureau and Smithsonian Institution measurements on atmospheric moisture and incident solar radiation were also obtained for the Washington site overpass. We have as yet no reports on the quality of the EREP data obtained.

- b. Recommendations concerning decisions and/or actions required to ensure attainment of the experiment's scientific objectives.

While we would prefer to have the land use climatology measurements obtained in the CARETS test site, we recommend that for SL-3 the option of a Southern California alternate site be retained, as the feasibility

4

of calibrating land use patterns in terms of energy exchange parameters could be determined as long as one of our investigators could visit the field site during the overpass, and as long as the swath length of the S192 sensor traverses a transition from urban to non-urban land uses. Recent correlative land use information for the test area is also required.

c. Expected accomplishments during the next reporting period.

We expect that our first-look data may be received during the next reporting period, in which case we will be able to perform an initial evaluation of the quality of the data. Consolidation of ground truth measurements for the June 12 Washington pass will also be done. Analysis of land use from U-2 imagery for the Census Cities and CARETS sites will continue, so that as much updating of the basic 1970 land use maps can be accomplished as possible while preparing for receipt of the Skylab data.

d. Significant results and their relationship to practical applications or operations problems.

N/A

e. Summary outlook for the remaining effort to be performed.

Based on our first view of S190A and S190B data which was shown to us by Mr. Dennis Williams of NASA/Houston during his visit to our office on July 9, 1973, we are encouraged concerning the feasibility of using these kinds of data for land use studies in metropolitan areas; therefore we are optimistic and hopeful that data for our test sites will be of similar quality. If so, we feel that we can satisfactorily achieve the goals of this investigation. We did not see any S192 data examples.

f. Travel summary and plans.

Travel during the past month included trips to the field sites in Riverside and suburban Washington during the Skylab passes of June 2 and June 12. Next expected travel is for similar measurements during SL-3.